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ABSTRACT

This module on auto body welding is the fourth of four (CE 028 303-306) in the auto body repair course of a bilingual vocational training program. The course is designed to furnish theoretical and laboratory experience in welding, metal straightening, metal finishing, painting, and use of power and hand tools. Module objectives are for students to develop trade-related Spanish/English vocabulary; to identify basic oxyacetylene welder components and their function, oxyacetylene welding flames and welds and how they are produced, and equipment set up procedures; and to identify general safety rules. Contents include list of module objectives; pretest; five sections on (1) basic acetylene welder components, (2) oxyacetylene welding flames, (3) equipment set up, (4) welds, and (5) oxyacetylene welding safety; posttest; and English/Spanish vocabulary list. Each section is organized into this format: instructions, vocabulary, and concepts (statements or questions to direct reading) presented in English and Spanish; readings; and worksheets to evaluate comprehension of the trade-related reading material. Worksheets also cover these areas: vocabulary, definitions, and word attack skills, writing skills, spelling, and application of terminology to the trade area. (YLB)

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ED199496

BILINGUAL VOCATIONAL TRAINING PROGRAM

AUTO BODY REPAIR

MODULE 4.0

AUTO BODY WELDING

CE 028 306

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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AUTO BODY REPAIR

Auto Body Repair is designed to furnish theoretical and laboratory experience in welding, metal straightening, metal finishing, painting and the use of power and hand tools. Shop procedures and equipment, common to that of the industry, are emphasized. Conditions and assignments are similar to those of a full time auto body repair shop.

ACTIVITIES

To clarify the purpose of each reading, the instructions, vocabulary and concepts are presented in Spanish and English.

Readings are followed immediately by a series of diversified work-sheets which evaluate comprehension of trade related material.

Oral language development exercises, directed by the instructor, are presented to re-enforce written concepts. Students are encouraged to utilize and expand their technical vocabulary by engaging in discussion with other students, the instructor and the tutor.

Audio visual materials are utilized to introduce subject matter. These materials are readily available to students and may be used on an individual or group basis.

Students are instructed to utilize supplementary material available in the Learning and Resource Center, and as a result re-enforce concepts presented in the module.

MODULE CONTENTS

4.1 Basic Acetylene Welder Components

4.2 Oxyacetylene Welding Flames

4.3 Equipment Set Up

4.4 Welds

4.5 Oxyacetylene Welding Safety

MODULE OBJECTIVES

1. To develop trade related Spanish/English vocabulary
2. To identify basic oxyacetylene welder components and their function
3. To identify oxyacetylene welding flames and how they are produced
4. To identify equipment set up procedures
5. To identify oxyacetylene welds and how they are produced
6. To identify general safety rules for oxyacetylene welding

EVALUATION

Module Pre-Test	(Any student who scores 90% or below will complete entire module)
Module Post-Test	(Any student who scores 90% or below will repeat areas where improvement is necessary)
Worksheets	
Oral Exercises	
Supplementary materials	

Pre-Test

1. Describe three types of oxyacetylene flames and how they are produced.
   1.
   2.
   3.

2. Name the three parts of an oxyacetylene flame and the function of each of the parts.
   1.
   2.
   3.

3. Name the components of an oxyacetylene welder and the function of each.

4. Explain recommended procedure for lighting an oxyacetylene welding torch.

5. Explain proper steps for setting up oxyacetylene welding equipment and checking it for leaks.

6. Name the five types of oxyacetylene welds and explain how each one is made.
   1.
   2.
   3.
   4.
   5.

7. Explain procedure for cutting sheet metal using an oxyacetylene cutting torch.

8. List 10 general oxyacetylene welding safety rules.

Instructions:

The following reading contains information on basic acetylene welder components. Read it carefully then answer the exercises.

Instrucciones:

La siguiente lectura contiene información tocante las partes del equipo de soldadura oxiacetilénica. Léala con cuidado y luego conteste los ejercicios.

Vocabulary	Vocabulario
cylinder	cilindro
hose	manguera
lighter	encendedor
thread	filete
valves	válvulas
regulator	regulador

Remember the following.
Recuerde lo siguiente.

1. The names of all parts of an oxyacetylene welder.
   Los nombres de todas las partes del equipo de soldadura oxiacetilénic

2. What purpose does each component serve?
   ¿Cuál es el propósito de cada parte?

Before a repairman attempts to do any welding, it is important that he be familiar with the components of an oxyacetylene welder.

Cylinder tanks are used for storage of oxygen and acetylene gases. Each cylinder has a release nozzle at the top which must have a protector cap when cylinder is in storage. Cylinders must always be kept in a vertical position.

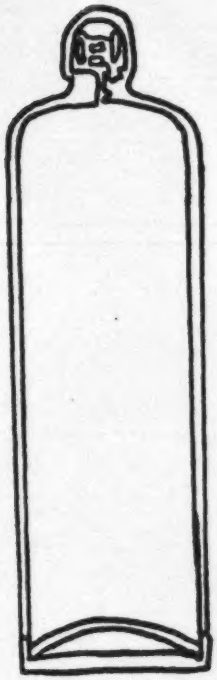
Regulators have two gauges which indicate the amount of pressurized gas in the cylinder and the amount of pressurized gas being released to the torch. Regulators have a release valve which allows the gas to travel from the regulator to the torch. They also have two connections, one for connecting to the cylinder nozzle and one for connecting the hose. Regulators for acetylene have left handed thread connections while oxygen regulators have right handed thread. This prevents accidentally connecting the oxygen hose to the acetylene connection and vice versa.

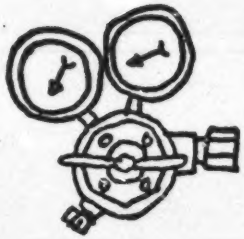
Hoses carry the gases from the regulators to the torch. Red or orange hoses are for acetylene gas and black or green hoses are for oxygen. Hose connection threads are similar to those on regulators oxygen hoses have right handed thread, acetylene hoses have left handed thread.

Torch body is responsible for mixing both gases. It contains two separate connections for the hoses and two adjustment valves for regulating the oxygen and acetylene.

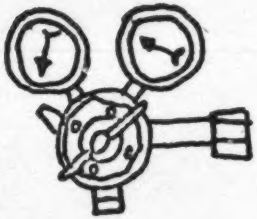
Tips are used to produce amount of heat needed to weld different metal thicknesses. Tips most commonly used are Nos. 1 through 4 with Nos. 1 and 2 most frequently used for automotive sheet metal.

Spark lighters are used to ignite the mixed gases. Under no circumstances should matches or cigarette lighters be used to ignite a torch. To ignite a torch it is recommended that the oxygen valve be opened about one-quarter turn, then the torch acetylene valve one full turn. The mixed gases are then lit with a spark lighter.

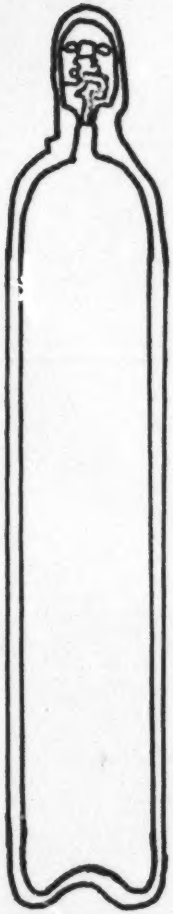




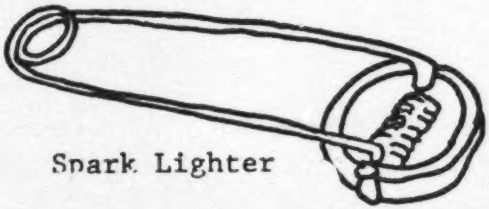
Acetylene
Regulator



Oxygen
Regulator



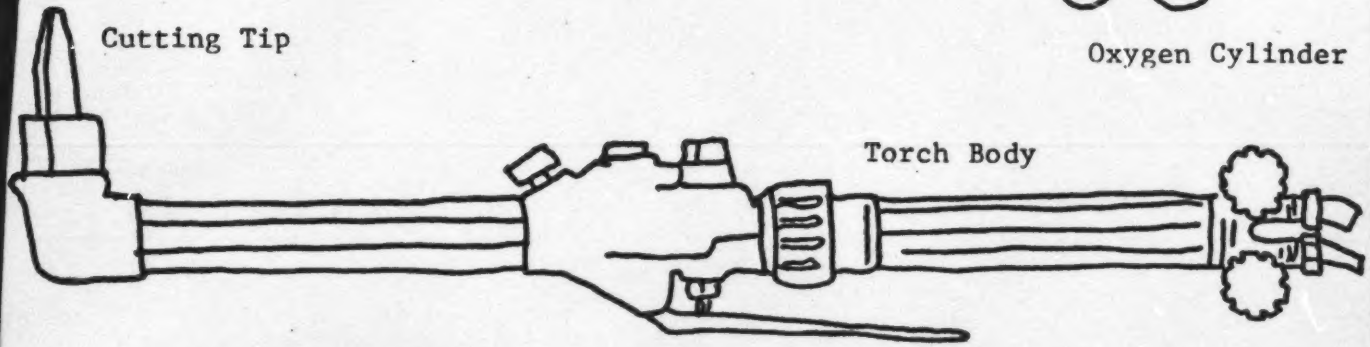
Acetylene Cylinder



Spark Lighter

Oxygen Cylinder

Cutting Tip



Torch Body

Fill in the blanks

1. Cylinder tanks store _____and _____.
2. The release nozzle at the top of the cylinder must have a _____ _____when in storage.
3. _____must always be kept in a _____position.
4. Regulators have two _____.
5. One gauge indicates the _____of pressurized gas in the cylinder and the other gauge indicates the _____of pressurized gas going to the torch body.
6. Oxygen connections always have _____handed thread.
7. Acetylene connections usually have _____handed thread.
8. Oxygen hoses are _____or _____in color.
9. Acetylene hoses are _____or _____in color.
10. Hoses carry gases from _____to the torch body.

Describe the following:

cylinder tanks

hoses

regulators

torch body

True or False

_____1. Hoses are connected to cylinders.

_____2. Oxygen hoses are red in color.

_____3. Acetylene hoses are red or orange.

_____4. Regulators have two gauges.

_____5. Regulators are connected to cylinders.

_____6. Oxygen hose connections usually have left handed thread.

_____7. Regulator gauges indicate quantity of gas in cylinder tank and amount of pressurized gas going to torch.

_____8. Spark lighters should always be used to ignite torch.

_____9. The torch body has two adjusting valves.

Circle the correctly spelled word.

1.	cylinder	silinder	cylander
2.	guage	gauge	gage
3.	thred	tred	thread
4.	valvi	velve	valve
5.	hos	hose	hosse
6.	lyter	lihter	lighter
7.	acetylene	aceytlene	asetylene
8.	regulater	regulator	ragulator
9.	torch	thorch	torsh
10.	oxigen	oxygen	oxigin

4.2

Instructions:

The following reading contains information on oxyacetylene welding flames. Read it carefully then complete the exercises.

Instrucciones:

La siguiente lectura contiene información tocante las llamas que se producen por el equipo de soldadura oxiacetilénica. Léala con cuidado y luego conteste los ejercicios.

Vocabulary	Vocabulario
oxyacetylene	oxiacetilénica
neutral	neutral
acetylene	acetileno
oxygen	oxígeno
flame	llama
welding	soldadura
oxidize	oxidar
carburize	carburizar

Remember the following.
Recuerde lo siguiente.

1. How the three distinct flames are produced.
   Como se producen las tres llamas distintas.

2. The parts of an oxyacetylene flame.
   Las partes de una llama oxiacetilénica.

Oxyacetylene Welding Flames

The oxyacetylene welder produces three distinct flames by burning different amounts of oxygen and acetylene. The three flames are neutral, carburizing and oxidizing.

A neutral flame is produced by burning approximately equal amounts of both gases. This flame is best suited for automotive sheet metal welding.

A carburizing flame is produced by burning more acetylene than oxygen. This flame can be used to weld sheet metal but the end result will be substandard and subject to premature failure.

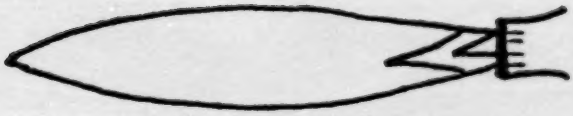
An oxidizing flame is produced by burning more oxygen than acetylene. This flame, like a carburizing flame, may be used to weld sheet metal. It, however, also produces a substandard weld.

Each of the three flames is easily recognized by the shape and characteristics of the individual flame which are the cone, feather and envelope.

The cone or inner part of the flame produces the heat needed for welding. The feather aids in adjustment of the neutral flame. The envelope or outer part protects the heated metal by keeping atmospheric oxygen (air) from contacting the heated portion. When heated metal comes in contact with oxygen it oxidizes or burns rapidly. The envelope protects the metal by consuming the atmospheric air before it contacts the hot metal. This envelope is what makes the oxyacetylene welder unique from other welding.

Flame Components

Types of Flames



Neutral

Oxidizing

cone is 2/10" shorter than cone on neutral flame

Carburizing

feather is 2 times the size of cone

Fill in the blanks

1. The three flames are easily recognized by the _____and _____of the individual flame.
2. The three flames are _____, _____and _____.
3. The two gases burned by an oxyacetylene torch are _____ and _____.
4. The _____flame is used for welding automotive sheet metal.
5. If more acetylene than oxygen is burned, a _____flame is produced.
6. To produce an oxidizing flame more _____than _____is burned.
7. The three parts of a flame are _____, _____and _____.
8. The _____helps adjust the flame.

True or False

_____1. Oxyacetylene torches work by burning oxygen and carbon.

_____2. Oxyacetylene welding requires the use of flux.

_____3. The envelope or outer part of the flame protects sheet metal from oxidation.

_____4. There are three parts to an oxyacetylene flame.

_____5. A carburizing flame is the best for welding sheet metal.

_____6. An oxidizing flame is not recommended for welding sheet metal.

_____7. The neutral flame is best for sheet metal welding.

_____8. Oxidizing flames are produced by burning more acetylene than oxygen

_____9. Carburizing flames burn more acetylene than oxygen.

____10. A neutral flame burns equal amounts of oxygen and acetylene.

Instructions:

The following reading contains information on setting up an oxyacetylene welder. Read it carefully then complete the exercises.

Instrucciones:

La siguiente lectura contiene información en como poner a funcionar el equipo de soldadura oxiacetilénica. Léala con cuidado y luego conteste los ejercicios.

Vocabulary	Vocabulario
nozzle	boquilla
foreign	extranjero
valve	válvula
cart	carretilla
expansion	expanción

Remember the following.
Recuerde lo siguiente.

1. How to set up the oxyacetylene welding equipment.
   Como poner a funcionar el equipo de soldadura oxiacetilénica.

2. The process of checking for leaks.
   El proceso para examinar por el escape de gases.

Equipment Set Up

Aside from being familiar with the oxyacetylene flames and equipment the repairman must know how to set up and check the welder. The following process should be performed when setting up and checking the welder.

Acetylene and oxygen cylinders must be securely fastened in a vertical position against a wall or on a cart. The protector caps are removed and the valves are quickly opened and closed. This will expel any foreign material.

The regulators are attached to the cylinder nozzles. The technician must remember that oxygen connections have right handed thread and acetylene connections have left handed thread. Once the regulators are properly attached, the cylinder valve is opened to allow gas into the regulator. Next, each regulator valve is quickly opened and closed to expel foreign matter.

Hoses are first connected to the regulator. After the connection, each regulator valve is again opened quickly and closed in order to clean out the hoses. The hoses are then connected to the torch body.

After being properly attached to both hoses the torch body is cleaned the same way as the other components. Before proceeding to light the torch the repairman must check for leaks.

When checking for leaks it is recommended that repairman follow these procedures.

1. Shut off all valves.
2. Open oxygen cylinder valve all the way.
3. Open acetylene cylinder valve 1/2 turn.
4. Open both regulator valves to 20 pounds per square inch (psi).

5. Apply soapy solution to all connections and any areas suspected of leaking.

Any leaks which exist at different connections may be detected by the expanding bubble of the soapy soultion which has been applied. Leaks must be corrected accordingly. By following aforementioned steps the repairman assures himself of proper and safe working equipment.

Fill in the blanks

1. Oxygen and acetylene cylinders must be securely fastened against a _____or a _____.

2. Acetylene regulator connections have _____handed threads.

3. The _____cap must be removed from the nozzle.

4. Before proceeding to light torch system, the technician must first check for _____.

5. _____must be attached to cylinder nuzzles.

6. Leaks will be found by expanding _____of a soapy solucion.

7. By opening and closing _____quickly, dirt and any other foreign substances are expelled.

Fill in the blanks

ac__t__l__ne	c__nn__ction
o__yg__n	va__ve
cy__i__der	tor__h
no__zl__	le__k
ox__ace__yle__e	t__re__d

Multiple Choice

1. Before using oxyacetylene equipment the repairman should

   A. check the equipment's condition.
   B. open the regulator.
   C. ignite the torch.

2. By opening and closing each cylinder valve quickly

   A. foreign substances are expelled.
   B. the torch is lit.
   C. leaks will be found.

3. Regulators are attached to

   A. cords.
   B. cylinders.
   C. torches.

4. Hoses are attached to

   A. oxygen cylinder.
   B. acetylene cylinder.
   C. oxygen and acetylene regulators.

5. Right handed thread connections are always on

   A. oxygen hoses and regulator.
   B. acetylene hose and regulator.
   C. acetylene tank.

6. Torch body is cleaned by opening and closing

   A. red hose.
   B. torch tip.
   C. oxygen and acetylene torch valves.

7. When checking for leaks both regulators are set at

   A. 7 psi.
   B. 10 psi.
   C. 20 psi.

8. When checking for leaks soapy water solution is applied to all

   A. threaded connections.
   B. suspected areas.
   C. both A and B.

Instructions:

The following reading contains information on oxyacetylene welds. Read it carefully then complete the exercises.

Instrucciones:

La siguiente lectura contiene información tocante los métodos de soldar. Léala con cuidado y luego conteste los ejercicios.

Vocabulary	Vocabulario
fusion	fusión
filler	rellenador
rod	varilla
braze	broncear
brass	bronce
joint	coyuntura
avoid	evitar

Remember the following.
Recuerde lo siguiente.

1. The five types of oxyacetylene welds.
   Los cinco tipos de soldadura oxiacetilénica.

2. How to cut metal with an oxyacetylene torch.
   Como cortar metal con una torcha oxiacetilénica.

Welds

Auto body welding has become almost exclusively limited to the use of an oxyacetylene welder because of the light gauge metal used in auto body constructions. Basically, there are five welds used in auto body. They are bead, bead and filler rod, butt joint, lap joint and brazing.

When running a bead weld the tip of the inner cone should be positioned approximately 1/8 inch above the work. The flame should be pointed in the direction where the welding process will end. The torch should be held so the centerline of the flame is at a 45° to 60° angle with the metal being welded. The flame (heat) is applied about 1/2 inch from the edge of the metal. When a puddle of melted metal, 1/4 inch in diameter, appears the flame should be moved slowly in the direction of the weld. The bead should be kept even. Welding rods are not required. The weld (fusion) takes place when the metal is melted.

Bead and filler rod welds are made similarly to bead weld. Coordination is essential in order to maintain a puddle while allowing the molten filler rod to dip into the puddle. Coordination is developed by using both hands. The flame must be kept at one end of the puddle and the filler rod at opposite end. Both rod and puddle must be kept at constant temperatures to assure proper penetration. Rod and flame angles should be at least 45°.

Butt joint welds are made at intervals of approximately one and one half inches (1 1/2) apart. These welds must be made quickly and as small as possible. Using bead and filler rod techniques, tack welds of 1/8 inch in diameter are made. Space

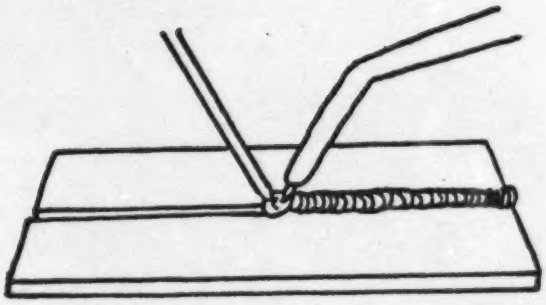
between tack welds may be filled if desired. Rod and flame angles may vary but should be at least 45°.

Lap joint welds are similar to butt welds. However, metal sections which will be joined together are overlapped about 1/2 inch and then welded. Tack or bead welds may also be used. Care must be exercised to protect against over heating the top section since it is closer to the flame. This can be avoided by keeping the torch at a 75° angle.

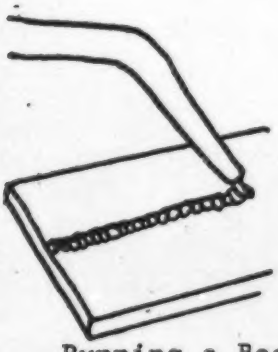
Brazing is welding with brass. Before brazing is started the metal must be cleaned with flux. Temperatures of above 1000°F are required and the metal must have a higher melting point than the brass filler rod. This weld is made similarly to bead and filler rod welds.

An oxyacetylene torch may also be used to cut sheet metal. Sheet metal is preheated from 1600 - 1800°F then sprayed with a stream of pure oxygen. Pure oxygen when applied to heated metal causes it to ignite and burn. This is a rapid form of metal oxidation.

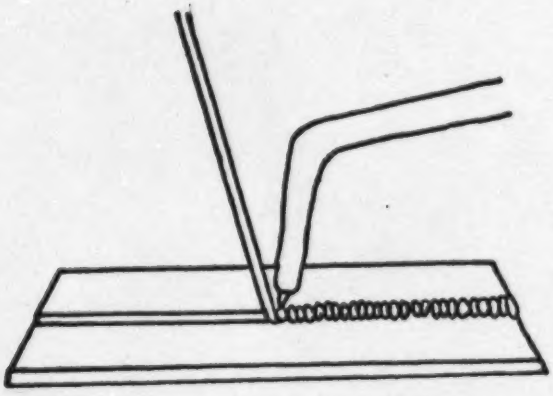
These welding skills require much practice. Safety is also very important. Both should be done repeatedly until a degree of skill is attained.



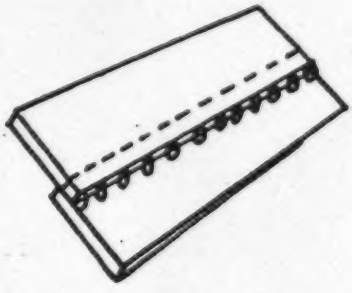
Bead and Filler Rod



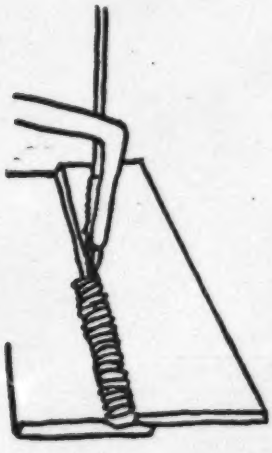
Running a Bead



Bead and Filler Rod
Lap Joints



Butt Weld
Lap Joint



Brazing a Lap Joint

True or False

____1. When running a bead, the torch tip should be positioned 1/8 inch above work.

____2. Welds should begin 1/2 inch from edge of metal.

____3. Oxidizing flame is used when running a bead.

____4. When a puddle appears it should be 1/4 inch in diameter.

____5. Bead and filler rod requires the use of only one hand.

____6. Butt welds are made at intervals.

____7. Torch angles vary but should be at least 45°.

____8. Lap joints are made by welding two separate pieces side by side.

____9. When making lap joints, one piece should be overlapped by 1/2 inch.

___10. Sheet metal may be cut with an oxyacetylene torch.

___11. Oxyacetylene cutting is a rapid oxidation process of metal.

___12. To cut sheet metal, it must be preheated to within 1600°-1800°.

___13. A stream of pure acetylene is applied to heated metal during cutting.

___14. Brazing is brass welding.

___15. Before braze welding, metal must be cleaned with flux.

Fill in the blanks

1. The flame should be pointed in the _____where the welding process will _____.
2. The diameter of the puddle should be _____inch.
3. There are basically _____welds used in auto body.
4. Welds which are made at intervals are called _____ _____welds.
5. Lap joint welds are made on metal sections which are _____ by about _____inch.
6. Sheet metal cutting is considered a rapid form of metal _____
7. _____is welding with brass.
8. During _____joint welding care must be taken to protect from over _____ top section .

Describe each of the following

brazing

butt welds

lap joint

running a bead

bead and filler rod welding

oxyacetylene cutting

Instructions:

The following reading contains general safety rules regarding oxyacetylene welding. Read it carefully then complete the exercises.

Instrucciones:

La siguiente lectura contiene reglas generales de seguridad tocante al equipo de soldadura oxiacetilénica. Léala con cuidado y luego conteste los ejercicios.

Vocabulary	Vocabulario
carbon	carbono
hydrogen	hidrógeno
dissociate	desunir
rules	reglas
safety	seguridad
precaution	precaución

Remember the following.
Recuerde lo siguiente.

1. The ten general safety rules of oxyacetylene welding.
   Las diez reglas generales de seguridad tocante al equipo de soldadura oxiacetilénica.

2. What are oxygen and acetylene
   ¿Qué son oxígeno y acetileno?

Oxyacetylene Safety

Oxygen in its pure state, is colorless, odorless and tasteless. If this gas comes in contact with other gases, oil or combustible vapors it becomes highly flammable and explosive.

Acetylene is composed of carbon and hydrogen. This gas is very unstable and when released it has a tendency to dissociate. Dissociation is when its compounds, carbon and hydrogen, separate. When dissociation occurs it produces tremendous heat which may cause an explosion. To protect against dissociation in the cylinder a chemical called acetone is added to the gas.

Because of the potential danger associated with the oxyacetylene welder, the following general safety rules must be practiced during auto body welding:

1. Always wear protective goggles and clothing.
2. Never weld, braze or heat metal near fuel tanks, fuel lines or concrete.
3. Never direct lit torch towards cylinders or persons.
4. Be alert at all times.
5. Check surrounding area for flammable material before beginning operation.
6. Protect vehicle interior from sparks and heat.
7. Use spark lighter to ignite torch.
8. Do not use acetylene gas at pressures above 12 pounds per square inch (PSI).
9. Keep fire extinguisher handy.
10. Keep cylinders in vertical position and securely fastened.

An oxyacetylene welder is essential to the success of any auto body repair shop. Oxyacetylene welders can be used to weld, solder-fill, braze, remove undercoating, straighten dents and cut sheet metal.

Fill in the blanks

1. _____and _____are gases used in oxyacetylene welding.
2. In its pure state _____is colorless, odorless and tasteless.
3. Acetylene is composed of _____and _____.
4. Dissociation is the _____of compounds or parts.
5. The chemical _____is added to acetylene to prevent dissociation
6. Always wear protective _____and clothing when welding.
7. Be _____at all times.
8. Use _____ _____to ignite torch.
9. Do not use acetylene at pressures above _____.
10. Never _____, _____ or heat metal near gasoline tanks, gasoline lines or concrete.
11. Practice _____at all times.

Describe the following

dissociation

acetylene

oxygen

Circle the correct spelling.

1.	safety	sayfty	safti
2.	percaution	precaution	precution
3.	rule	rul	rull
4.	carben	carban	carbon
5.	dissociation	discociation	dissosiation
6.	haydrogen	hydrogen	hidrogan
7.	assetone	acetone	aceton
8.	genaral	ganeral	general
9.	oxygen	oxigen	oxigan
10.	asetilene	acetylene	assetalin

List seven of the ten general safety rules.

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

I. Oxyacetylene Flames

___Oxidizing Flame
___Carburizing Flame
___Neutral Flame
___Feather
___Cone
___Envelope

A. a part of the flame which helps adjust neutral flame.
B. is the part of the flame which protect metal from oxidation.
C. is produced by burning more acetylene than oxygen.
D. is produced by burning more oxygen than acetylene.
E. is produced when equal amounts of acetylene and oxygen are burned.
F. is the inner part of the flame which produces heat.

II. Oxyacetylene Components

___Cylinder Tanks
___Regulators
___Acetylene Hoses
___Oxygen Hoses
___Torch Body
___Acetylene Connections
___Oxygen Connections

A. always have right handed threads.
B. are black or green in color.
C. mixes both gases.
D. is red or orange in color.
E. always have left handed threads.
F. are used to store acetylene and oxygen gases
G. include 2 gauges which indicate the amount of pressurized gas which is being released to the torch.

III. Oxyacetylene Welding Methods

___Bead Welds
___Bead and Filler Rod Welds
___Butt Joints
___Lap Joints
___Brazing
___Metal Cutting

A. is a rapid form of metal oxidation.
B. are similar to butt welds.
C. are made similarly to bead welds.
D. is welding with brass.
E. are made at 1/2 inch intervals.
F. are made by running a continuous puddle from one end of the metal being welded to the opposite end.

IV. Oxyacetylene Welding Safety

___Oxygen	A. is colorless, odorless and tasteless.
___Acetylene	B. is used for igniting torch.
___Acetone	C. is the chemical which is added to acetylene to protect against dissociation.
___Spark Lighter	D. is composed of carbon and hydrogen.
___Cylinders	E. should never be directed towards a person or cylinder.
___Welding	F. must be securely fastened and in an upright position.
___Lit Torch	G. should never be done near fuel tanks, fuel lines, or concrete.

V. Setting up Welder

Explain proper steps for setting up oxyacetylene equipment and checking it for leaks.

Vocabulary	Vocabulario
acetone	acetona
acetylene	acetileno
adjust	ajustar
alert	alerto
angle	ángulo
approximate	aproximar
atmosphere	atmósfera
avoid	evitar
bead	reborde
brass	bronce
braze	broncear
bubble	burbuja
butt	cabo
carbon	carbón
carburize	carburizar
cart	carretilla
characteristic	característico
combustible	combustible
component	componente
cone	cónico
connect	conectar
consume	consumir
contact	contacto
coordinate	coordinar
cylinder	cilindro
detect	decubrir
diameter	diámetro

Vocabulary	Vocabulario
dissociate	desunir
distinct	distincto
edge	orilla
envelope	envolver
equipment	equipaje
essential	esencial
exclusive	exclusivo
exist	existir
expand	extender
expel	expulsar
explosive	explosivo
extinguisher	extinguidor
familiar	familiar
feather	cuña, lengueta
filler	rellenador
flame	llama
flammable	inflamable
flux	fundente
foreign	extranjero
frequent	frequente
fusion	fusión
gasoline	gasolina
gauge	indicador
general	general
goggles	anteojos de seguridad
heat	calor
hose	manguera

Vocabulary	Vocabulario
hydrogen	hidrógeno
ignite	encender
indicate	indicar
individual	individual
interval	intervalo
joint	coyuntura
lap	cubrejunta, recubrir
leak	escape
lighter	encendedor
melt	derritir
mix	mezclar
neutral	neutral
nozzle	boquilla
overlap	solapar
oxidize	oxidar
oxyacetylene	oxiacetilénica
oxygen	oxígeno
penetrate	penetrar
position	posición
precaution	precaución
premature	prematuro
pressurize	sobre comprimido
process	proceso
produce	producir
protect	protejer
puddle	cenagal
quarter	cuarto

Vocabulary	Vocabulario
rapid	rápido
regulator	regulador
rod	varilla
rule	regla
safety	seguridad
section	sección
secure	seguro
soap	jabón
solution	solución
spark	chispa
spray	rociar
storage	almacenaje
suspect	suspechar
tank	tanque
temperature	temperatura
thread	filete
tip	punta
torch	antorcha
unique	sinigual
unstable	instable
valve	válvula
vapor	vapor
vertical	vertical
welding	soldadura